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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,710	03/16/2004	Minoru Hanazaki	67161-145	1760

7590 04/03/2006

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EXAMINER	
CAZAN, LIVIUS RADU	

ART UNIT	PAPER NUMBER
3729	

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/800,710	HANAZAKI, MINORU	
	Examiner	Art Unit	
	Livius R. Cazan	3729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/16/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The disclosure is objected to because of the following informalities: on page 1, line 16, "quart" should read --quartz--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "a determining unit ... detecting unit" (claim 1, lines 6-7) is vague and/or indefinite. It is unclear as to how the determining presence/absence of sticking of the wafer is actually performed since there is no recitation of any structural/operational relationship between the determining unit and the vibration detecting unit in the claim.

Regarding claim 8, it is unclear what is meant by "configured with a single module." It is unclear whether the vibration applying and receiving units each have a single module, and if so, it is unclear what is meant by "module," or whether the two units are part of the same module. A still further interpretation is that the same unit can be used to detect and apply vibration.

Regarding claim 11, the phrase "*the* vibration having a frequency of no less than 120 Hz" lacks proper antecedent basis. Although in claim 1 vibration is applied, no vibration having a frequency of at least 120 Hz is discussed.

Regarding claim 2, "waver" in line 2 should read --wafer--.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, and 7-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Hara et al. (US5155523).

a. Regarding claim 1, Hara et al. disclose a semiconductor processing apparatus, comprising:

- a vibration applying unit (piezoelectric vibrators 7, 9, and 11 in Fig. 2) attached to a wafer mounting electrode (wafer support 2 in Fig. 2 can be rotated by shaft 4, which inherently must be driven by an electromechanical actuator comprising an electrode) and applying vibration to a wafer mounted on said electrode; the vibration applying unit is operatively attached to said electrode and applies vibration so as to cancel the detected vibration of the wafer support structure.
- a vibration detecting unit (acceleration sensors 6, 8, and 10 in Fig. 2) attached to the wafer mounting electrode (the detecting units are

operatively attached to the electrode) and detecting vibration induced at the wafer mounted on said electrode;

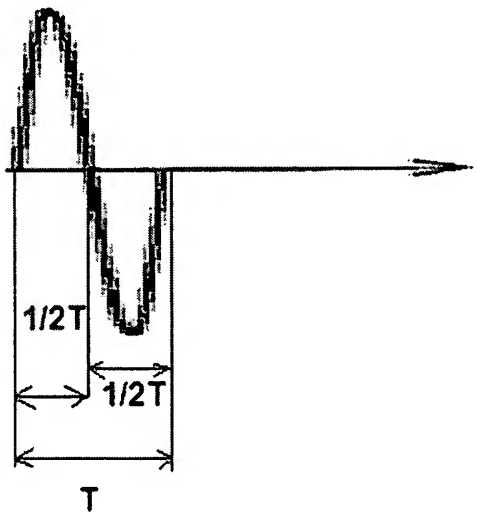
- and a determining unit determining presence *or* absence of sticking of said wafer; it is well known in the art that an exposure apparatus for semiconductor wafers will *always* have alignment means which detect the presence of the wafer and its position relative to a desired orientation, based on alignment marks on the wafer. If the alignment means do not detect the presence of a wafer, then with certainty no sticking has occurred. In general, Hara et al. discuss only the wafer supporting mechanism of a semiconductor processing apparatus such as an exposure apparatus shown schematically in Fig. 9. The presence of alignment means, however, can be inferred from the first step in Fig. 10 (fine-motion correction of wafer attitude completed). Such a step could not be completed without alignment means.

b. Regarding claim 2, Hara et al. disclose changing a frequency of vibration over time. The applied vibration is determined based on the detected vibration, and, since the frequency of detected vibration will be different at various times, so will the applied frequency of vibration.

c. Regarding claim 7, the vibration detection units are capable of detecting a vibration having a frequency that corresponds to a natural frequency of the wafer, and the vibration generators can generate vibration having such a frequency. Also see ln. 50 of col. 3 to ln. 60 of col. 4.

d. Regarding claim 8, as best understood, Hara et al. disclose vibration detectors and generators that are part of the same module, i.e. a vibration suppression system.

e. Regarding claims 9-11, Hara et al. disclose applying vibration having a frequency of more than 120Hz, i.e. 160Hz (col. 4, lns. 15-60). As it will be appreciated by one skilled in the art, vibration in itself is in the form of pulses and has a 50% duty ratio. See image below.



6. Claims 1, 2, and 7-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Takabayashi et al. (US5187519).

a. Regarding claim 1, Takabayashi et al. disclose a semiconductor processing apparatus, comprising:

- a vibration applying unit (such as actuators 13 and 14 in Fig. 2) operatively attached to a wafer mounting electrode (electrodes in the drive mechanism for stages 8 and 9 in Fig. 1) and applying vibration to a wafer

operatively mounted on said electrode; the vibration applying unit is operatively attached to said electrode and applies vibration so as to cancel the detected vibration of the wafer support structure; see col. 7, lns. 20-40;

- a vibration detecting unit (acceleration pickup sensor 16 and displacement sensor 17 in Fig. 2) operatively attached to the wafer mounting electrode and detecting vibration induced at the wafer; see col. 6, lns. 35-45.
- a determining unit (alignment scope 2 in Fig. 1) determining presence *or* absence of sticking of said wafer; if no wafer is present, alignment cannot occur, and processing would not continue. If no wafer is present, hen with certainty no sticking has occurred; see col. 4, lns. 35-45 regarding the alignment scope.

b. Regarding claims 2 and 7-10, see the rejection in part (5) above. The arguments are the same.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 1, 7, and 8 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. in view of applicant's admitted prior art (APA).

a. Hara et al. disclose a semiconductor processing apparatus, comprising:

- a vibration applying unit (piezoelectric vibrators 7, 9, and 11 in Fig. 2) attached to a wafer table (wafer support 2 in Fig. 2) and applying vibration to a wafer mounted on said wafer table;
- a vibration detecting unit (acceleration sensors 6, 8, and 10 in Fig. 2) attached to the wafer table and detecting vibration induced at the wafer mounted on the wafer table;

Hara et al. do not disclose a determining unit determining presence or absence of sticking of the wafer and uses a vacuum chuck instead of an electrostatic chuck, therefore lacking the wafer mounting electrodes.

APA teaches the use of a determination circuit in a semiconductor processing apparatus, said circuit being able to determine sticking of the wafer (page 2, lns 5-21 of the present specification). APA further teaches the use of an electrostatic chuck for holding the wafer on the wafer table (page 3, lns. 4-20 of the present specification).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Hara et al., in view of the teachings of APA, by providing the apparatus with an electrostatic chuck for holding the wafer in order to allow holding of the wafer without the need for a vacuum system, and by providing a determining unit/circuit capable of detecting sticking of the wafer, in order to avoid any troubles attributed to the occurrence of sticking (page 2, ln. 18 of the present specification).

b. Regarding claims 7 and 8, see the corresponding rejection under 35 U.S.C 102(b) above.

9. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. and APA as applied to claim 1, and further in view of Abry et al. (US5993615).

Hara et al. and APA disclose the same invention as the applicant except for an output unit outputting an alarm when sticking is present, a stop unit stopping processing when sticking is present, and a communication unit sending sticking information to a host computer when sticking is present.

Abry et al. teach a unit (PLC 28 in Fig. 2) in a semiconductor processing apparatus, said unit being capable of sending processing data to a computer, outputting an alarm when a faulty/undesired operation/event has taken place and of stopping further processing (col. 4, lns. 1-35).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to use such a unit (which can act as a stop unit, output unit, and communication unit) to output an alarm, stop further processing, and transmit data to a host computer when an undesired event occurs (such as wafer sticking), in view of the teachings of Abry, in order to improve the reliability and efficiency of wafer processing.

10. Claims 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. and APA as applied to claim 1, and further in view of Collins et al. (US5874361).

Hara et al. and APA disclose the same invention as the applicant, except for a processing unit for cancellation of sticking, said unit including at least two structures out of a mechanical structure, a structure supplying gas, or a structure generating plasma, said structures being for cancellation of said sticking.

Collins et al. teach using a plasma-generating structure to generate plasma so as to allow unsticking of the wafer and using a mechanical structure to unstick the wafer from the wafer table (ln. 65 of col. 7 to ln. 20 of col. 8). Collins et al. also teach using a mechanical structure and/or a gas supplied by a supply structure to dechuck the wafer (col. 8, lns. 20-55; also col. 4, lns. 1-20).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor apparatus of Hara et al. and APA, in view of the teachings of Collins et al., by providing such processing units including mechanical structures, gas supply structures and/or plasma-generating structures in order to facilitate easy dechucking of wafers.

Furthermore, regarding claim 20, it is readily apparent that controlling the processing unit must be done via an automated system such as a computer control unit. Collins et al. teach such a unit (100 in Fig. 1). Therefore it would have been obvious to one or ordinary skill in the art at the time the invention was made to provide a control unit in order to control the sticking cancellation processing unit a predetermined number of times.

Allowable Subject Matter

11. Claims 3-6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Remarks

12. The structure disclosed by Hara et al. does not serve the same purpose as envisioned by the applicant. However, the language of claim 1 is not sufficiently limiting. The applicant is advised to reword the limitations of claim 1 in means-plus-function language or to make the limitations of claim 1 more specific, so as to unquestionably overcome prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Livius R. Cazan whose telephone number is (571) 272-8032. The examiner can normally be reached on 7:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on (571)272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LRC 03/28/2006

PETER VO
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